

# Mobile Degaussing Support

BY LIEUTENANT COMMANDER G. W. MITCHELL, U. S. NAVY

CO, USS *Surfbird* (ADG 383)

It is the change in the earth's magnetic field caused by the presence of a ship which arms and fires magnetic mines and torpedoes. The purpose of degaussing as a whole is to minimize this change, and thereby increase the safety of ships. A ship without proper degaussing is not combat ready.

During the last war the Navy developed a degaussing ship to provide deperming and flashing magnetic treatment for LST, DD, SS, and smaller classes of ships operating from advanced bases. These degaussing ships, designated YDGs, were usually assigned to an advanced base complex. They were used primarily as a power source for furnishing the necessary electrical power for deperming and flashing, and eliminated the need for a deperming station and deck. However, it was still necessary to construct and establish a shore based degaussing range.

The degaussing ranges required as long as three months to establish, and quite often it proved impossible to establish a range in a needed locality because of the necessity for placing the degaussing coils below the surface of the water at a depth about equal to the beam of the ships using the range. The site chosen had to be free of excessive currents, have sufficient sea room for maneuvering, and the bottom firm enough to support the range coils. These conditions all had to be met, and still be in close proximity to a site on shore where a range control station could be constructed. A range site such as this could seldom be found.

It was usually necessary to build up from the bottom an extensive underwater structure of concrete and piling, in order to obtain the desired depth for the range coils, and to build a range control station on shore. Under this arrangement, the degaussing range could not be considered mobile, nor could it be moved to a forward area. This was acceptable, since once a ship received degaussing treatment in a rear area, it could be expected that her magnetic state would remain within acceptable limits for some time.

After World War II, mines were developed which utilized magnetic influence explosive far more sensitive than any used during the war. This meant that the degree of protection afforded ships against magnetic mines had to be greatly increased. No mine sweepers then existing were capable of sweeping these mines safely. Therefore, it became necessary to build new types of mine sweepers, with magnetic fields about one-tenth that of World War II sweepers. New degaussing range coils and other magnetic measuring equipment of a very high sensitivity necessary to measure and calibrate the low magnetic fields of the new mine sweepers were also developed.

Maintaining the low magnetic signatures of the new mine sweepers while engaged in sweeping operations is critical and requires frequent checking during extended sweeping operations. For example, the misplacing of a few food cans could mean disaster for the sweeper. Consequently, to meet the



Mark 42 Mod 6 degaussing range control system installed in *Surfbird*.

need for providing mobile degaussing support to mine sweepers operating in forward areas, the Chief of Naval Operations placed upon the degaussing ship, which in the meantime had been designated ADG, the additional requirement that she have the capability of establishing and operating high-sensitivity degaussing ranges for MSOs, MSCs, and mine sweeping boats, immediately upon arrival in a new location.

The establishing of a high-sensitivity degaussing range is far more difficult than for regular degaussing ranges. The high-sensitivity coils are about seven feet in length. For an MSO-MSO range, ten of these coils must be placed on an east-west magnetic line with a distance of 10 feet between each coil. The center of the coil must be at a depth of 30

feet below the average sea level. The coil must be maintained in a vertical position and free from any motion or current vibration. The range for mine sweeping boats, such as the MSB, MSI, UB-MS and ML-MS, is the same as for the MSO-MSO range except that the depth of the coil must be 15 feet and the coil spacing 5 feet.

This arrangement, together with the necessity of building a range control facility on shore, precluded mobility. The choice of site was also very limited. As an example, it required several months to establish a high-sensitivity range for mine sweepers at Sasebo, Japan.

The main difficulty was still one of not being able to locate in one area a site which had the correct depth of water, level bottom, and sea room, and yet

be near enough to a site on shore for building the shore facility, the choice of which is also limited.

The first problem encountered in developing a mobile degaussing facility was one of being able to eliminate the need for a shore based range control system. The range control system is an arrangement of electrical components which are designed to measure and record the changes in the earth's magnetic field induced in the submerged coils when a ship passes over the line of coils. The currents resulting from these magnetic flux changes are conducted from the coils through cables to the range control system where they are integrated and recorded on photoelectric recording fluxmeters.

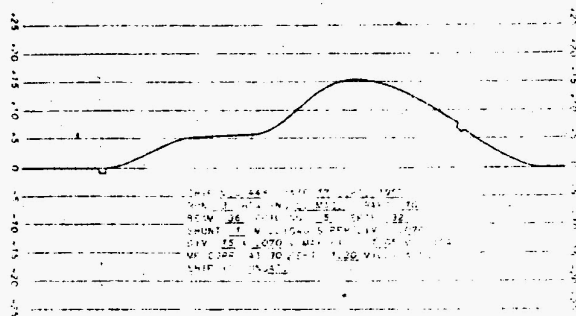
This unit is extremely sensitive, and must be located in a space that is free from vibration, dust, drafts, excessive temperature change, and dampness. Also, any motion of the ship which would cause a movement of the fluxmeter mountings from the horizontal would deflect the recording device and introduce error into the readings.

Being able to have the range control system on board the ADG would greatly enlarge the choice of sites for installation of the underwater components, since the ship could move and find somewhere in the vicinity of a given sweep area, the necessary 30 and 15 foot depths of water which would have sea room and a level bottom over an area of 120 feet. At such a location, installation of the range coils could be fairly quick and simple.

Tests conducted by *Surfbird*, which had recently been converted from an MSF to an ADG, proved that it was possible to obtain results from the fluxmeters operating on shipboard which were equal to those obtained from the shore installations. Adequate space, meeting the requirements for the range control system, was made available on the ship and in March of 1957, we installed a Mark 42 Mod 6 range control system on board. The fluxmeters are mounted in such a way that the ship's motion will not affect the recording device unless the ship is rolling in excess of 5 degrees, which would seldom, if ever, be experienced while moored. Vibration within the ship which would seriously affect the fluxmeter element, which is a taut suspension-type D'Arsonval moving coil galvanometer, is eliminated during actual ranging operation by securing all machinery in the ship except one ship's service gen-

erator located several compartments forward of the range control system space.

To lay the mobile degaussing range, the ship proceeds to the selected site and by means of a four point moor is aligned on the east-west magnetic axis of the range. Ten davits have been fitted along the side of *Surfbird*, spaced ten feet apart. With the ship on the line, all ten coils installed in tripods are lowered to the bottom, and a diver is then sent down to check the coils for verticality, elevation, spacing, and alignment. The two-conductor cable to each coil is kept in hand on board. The bow anchor and one of the stern anchors are then recovered, and the ADG made to swing perpendicular to the range axis and again moored, clear of the range. The conductor cables are connected to the control system on board, and calibration tapes are run on the fluxmeters. The ADG is then ready to range check and calibrate the mine sweepers.



Magnetic signature of a mine sweeper obtained by *Surfbird's* shipboard controlled mobile degaussing range for low-signature mine craft.

This arrangement makes it possible for the ADG to operate as many as three degaussing ranges at the same site. These ranges usually consist of a 15 foot range for mine sweeping boats, a 30 foot range for MSC MSO, and a regular degaussing range for steel hull ships. *Surfbird* was able to install and place in operation a range at Sasebo in a few hours. So far, over 150 ships have used this range. We have also installed, operated, and recovered ranges in Korean waters on a completely mobile basis.

In addition to operating mobile degaussing ranges, *Surfbird* also provides mobile deperming, flashing, magnetometer calibration, inspection, and degaussing repair to all ships operating in the Western Pacific.